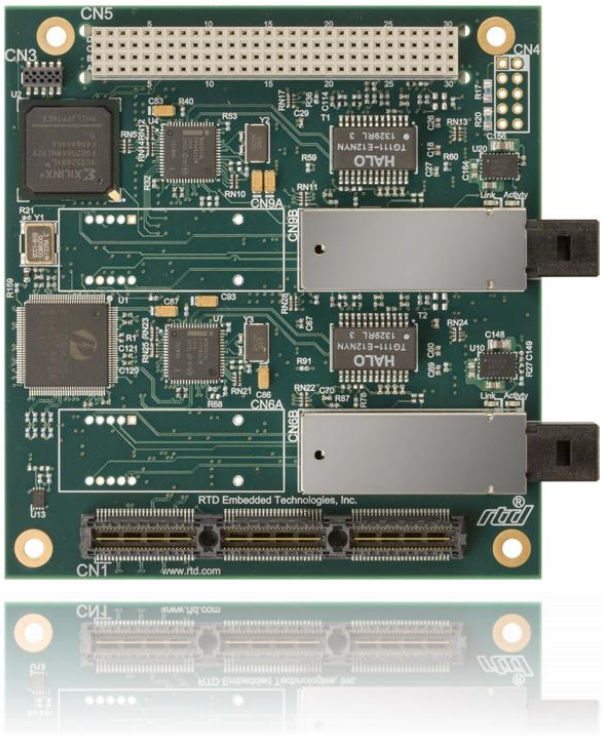
LAN25215HR/LAN35215HR

PCI/104-Express Dual 100Mb/s Fiber Ethernet Controller

User's Manual

BDM-610020111 Rev. A



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Revision History

Rev A	Initial Release

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1 Introduction

1.1 Product Overview

The LAN25215 and LAN35215 are dual 100Mb/s Fiber Ethernet Modules. They provide two independent 100Mb/s fiber Ethernet connections using two Gigabit Ethernet controllers interfaced with an Ethernet PHY Transceiver and fiber connector. This board runs completely off of the PCI-Express bus, utilizing Intel's WG82574IT Gigabit Ethernet controller.

The LAN25215 is the PCI/104 Express version that has a pass-through PCI connector.

1.2 Board Features

- 2 Independent 100Mb/s Fiber Ethernet Connections
  - Intel 82574IT Gigabit Ethernet Controllers
  - Cortina (Intel) LXT973 Ethernet PHY Transceivers
  - MT-RJ Fiber Transceiver (Multi-Mode)
    - Avago AFBR-5903AZ
  - LC Fiber Transceiver (Single-Mode)
    - Avago AFXT-5971ALZ
- Onboard LEDs to monitor Link Status and Activity for each port
- PCIe x 1 Interface
  - Universal Board can be used with a PCIe/104 Type 1 or Type 2 host
  - Lane repopulation allows maximum system expansion
- PCI Express Bus:
  - Provides 2.5 Gbps in each direction
  - Single lane and single Virtual Channel operation
    - Compatible with multi-Virtual Channel chipsets
  - Packetized serial traffic with PCI Express Split Completion protocol
  - Data Link Layer Cyclic Redundancy Check (CRC) generator and checker
  - Automatic Retry of bad packets
  - In-band interrupts and messages
  - Message Signaled Interrupt (MSI) support
- PCI Bus is used as a pass through interface.

1.3 Ordering Information

The LAN25215/LAN35215 is available with the following options:

Table 1: Ordering Options

Part Number	Description
LAN25215HR	PCI/104 Express - Dual 100Mb/s Fiber Ethernet Controller
LAN25215HR-SM	PCI/104 Express - Dual 100Mb/s Fiber Ethernet Controller, Single Mode Transceiver
IDAN-LAN25215HR	Dual 100Mb/s Fiber Ethernet Controller in IDAN enclosure
LAN35215HR	PCIe/104 Dual 100Mb/s Fiber Ethernet Controller
LAN35215HR-SM	PCIe/104 Dual 100Mb/s Fiber Ethernet Controller, Single Mode Transceiver
IDAN-LAN35215HR	Dual 100Mb/s Fiber Ethernet Controller in IDAN enclosure

The Intelligent Data Acquisition Node (IDAN™) building block can be used in just about any combination with other IDAN building blocks to create a simple but rugged 104™ stack. This module can also be incorporated in a custom-built RTD HiDAN™ or HiDANplus High Reliability Intelligent Data Acquisition Node. Contact RTD sales for more information on our high reliability systems.

1.4 Contact Information

1.4.1 Sales Support

For sales inquiries, you can contact RTD Embedded Technologies sales via the following methods:

Phone: 1-814-234-8087 Monday through Friday, 8:00am to 5:00pm (EST).
E-Mail: sales@rtd.com

1.4.2 Technical Support

If you are having problems with you system, please try the steps in the Troubleshooting section of this manual.

For help with this product, or any other product made by RTD, you can contact RTD Embedded Technologies technical support via the following methods:

Phone: 1-814-234-8087 Monday through Friday, 8:00am to 5:00pm (EST).
E-Mail: techsupport@rtd.com

2 Specifications

2.1 Operating Conditions

Table 2: Operating Conditions

Symbol	Parameter	Test Condition	Min	Max	Unit
V_{cc5}	5V Supply Voltage		4.75	5.25	V
V_{cc3}	3.3V Supply Voltage		n/a	n/a	V
V_{cc12}	12V Supply Voltage		n/a	n/a	V
T_a	Operating Temperature		-40	+85	C
T_s	Storage Temperature		-55	+125	C
RH	Relative Humidity	Non-Condensing	0	90%	%
MTBF	Mean Time Before Failure	Telcordia Issue 2 30°C, Ground benign, controlled		TBD	Hours

2.2 Electrical Characteristics

Table 3: Electrical Characteristics

Symbol	Parameter	Test Condition	Min	Typ	Max	Unit
P	Power Consumption	V_{cc5} = 5.0V		5.5		W
I_{cc}	5V Input Supply Current	Active		1.1		mA
PCIe/104 Bus						
	Differential Output Voltage		0.8		1.2	V
	DC Differential TX Impedance		80		120	Ω
	Differential Input Voltage		0.175		1.2	V
	DC Differential RX Impedance		80		120	Ω
	Electrical Idle Detect Threshold		65		175	mV

3 Board Connection

3.1 Board Handling Precautions

To prevent damage due to Electrostatic Discharge (ESD), keep your board in its antistatic bag until you are ready to install it into your system. When removing it from the bag, hold the board at the edges, and do not touch the components or connectors. Handle the board in an antistatic environment, and use a grounded workbench for testing and handling of your hardware.

3.2 Physical Characteristics

- Weight: Approximately 90 g (0.20 lbs.)
- Dimensions: 90.17 mm L x 95.89 mm W (3.550 in L x 3.775 in W)

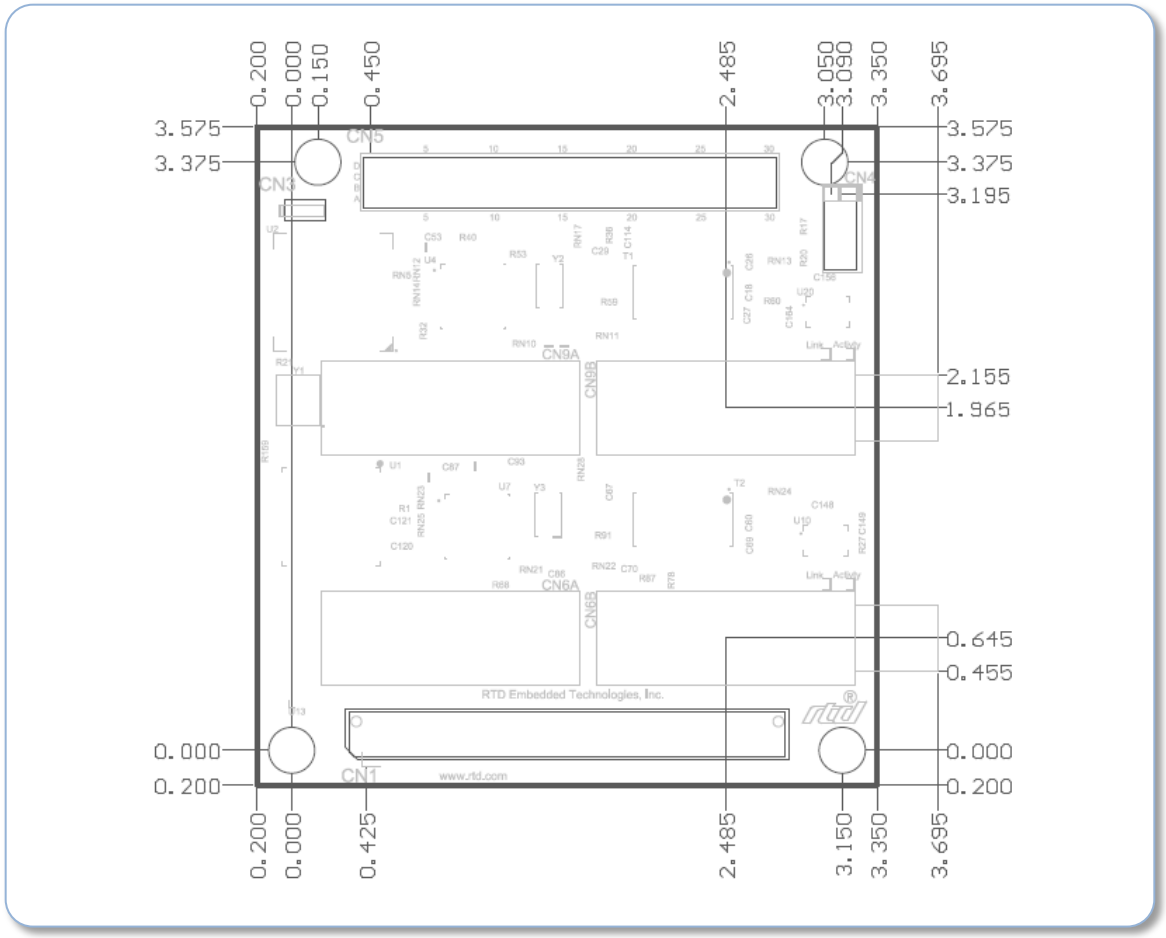

Figure 1: Board Dimensions

3.3 Connectors and Jumpers

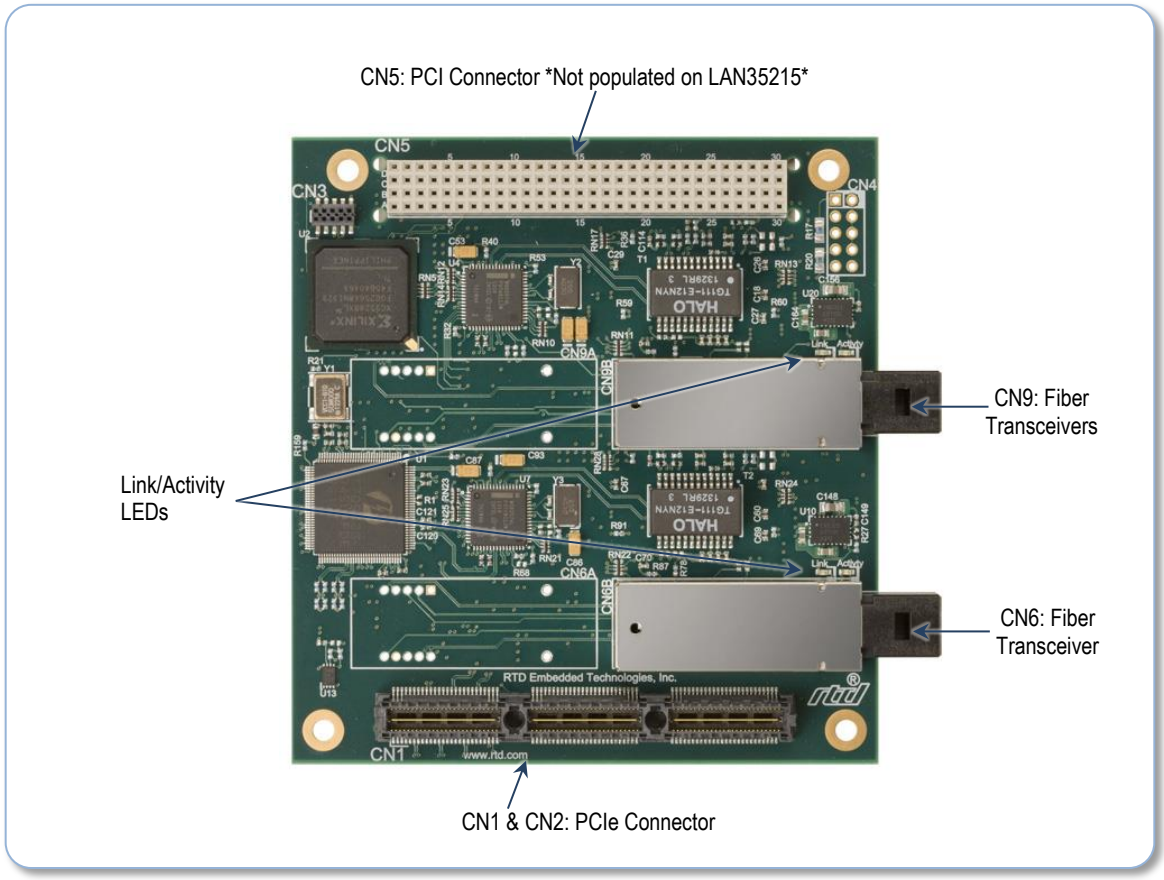

Figure 2: Board Connections

3.3.1 External I/O Connectors

CN9: Fiber Transceivers

Port 0 Fiber Connector

CN6: Fiber Transceivers

Port 1 Fiber Connector

Link and Activity LEDs

The LEDs provide status information. Each is a green LED, when the link is established the Link LED will illuminate. When there is activity on that port the Activity LED will illuminate.

3.3.2 Bus Connectors

CN5: PCI Connector

The PCI connector is the connection to PCI peripheral modules. This connector is used only as a pass through connector on this board. This connector is not populated on the LAN35215 version.

CN1(Top) & CN2(Bottom): PCIe Connector

The PCIe connector is the connection to the system CPU. The position and pin assignments are compliant with the *PCI/104-Express Specification*. (See PC/104 Specifications on page 18)

The LAN25215/35215HR is a "Universal" board, and can connect to either a Type 1 or Type 2 PCIe/104 connector.

3.4 Steps for Installing

1. Always work at an ESD protected workstation, and wear a grounded wrist-strap.
2. Turn off power to the PC/104 system or stack.
3. Select and install stand-offs to properly position the module on the stack.
4. Remove the module from its anti-static bag.
5. Check that pins of the bus connector are properly positioned.
6. Check the stacking order; make sure all of the busses used by the peripheral cards are connected to the cpuModule.
7. Hold the module by its edges and orient it so the bus connector pins line up with the matching connector on the stack.
8. Gently and evenly press the module onto the PC/104 stack.
9. If any boards are to be stacked above this module, install them.
10. Attach any necessary cables to the PC/104 stack.
11. Re-connect the power cord and apply power to the stack.
12. Boot the system and verify that all of the hardware is working properly.

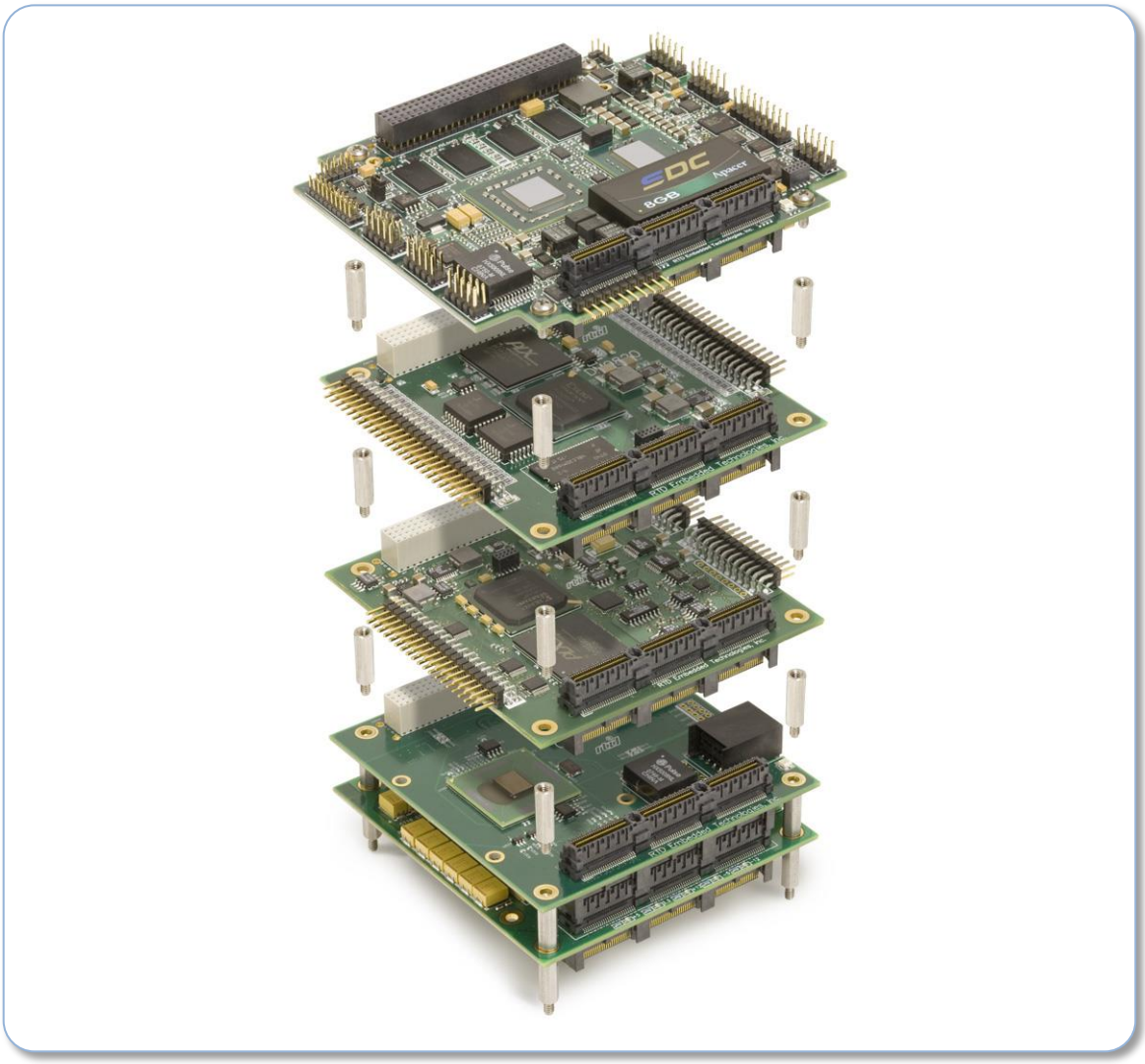

Figure 3: Example 104™ Stack

4 IDAN Connections

4.1 Module Handling Precautions

To prevent damage due to Electrostatic Discharge (ESD), keep your module in its antistatic bag until you are ready to install it into your system. When removing it from the bag, hold the module by the aluminum enclosure, and do not touch the components or connectors. Handle the module in an antistatic environment, and use a grounded workbench for testing and handling of your hardware.

4.2 Physical Characteristics

- Weight: Approximately 0.21 Kg (0.46 lbs.)
- Dimensions: 151.972 mm L x 129.978 mm W x 16.993 mm H (5.983 in L x 5.117 in W x 0.669 in H)

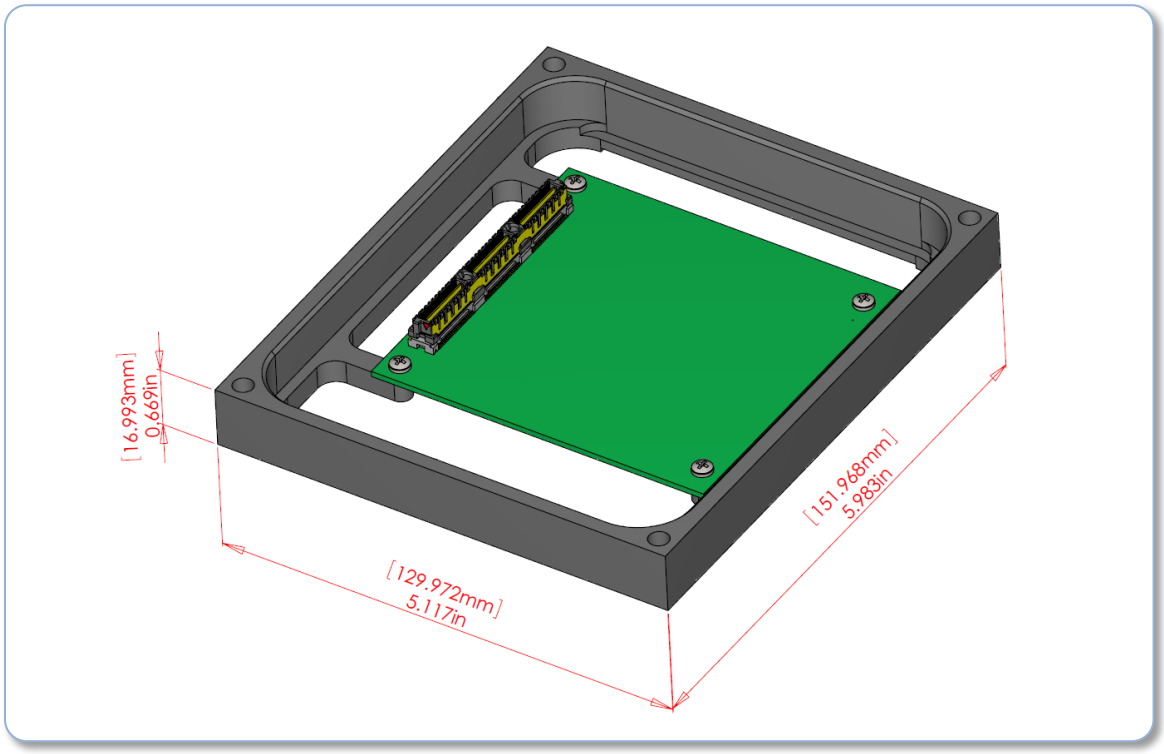

Figure 4: IDAN Dimensions

4.3 Connectors

4.3.1 External I/O Connectors

CN9: Fiber Transceivers

Port 0 Fiber Connector

CN6: Fiber Transceivers

Port 1 Fiber Connector

4.3.2 Bus Connectors

CN1: PCI Connector

The PCI connector is the connection to PCI peripheral modules. This connector is used only as a pass through connector on this board. This connector is not populated on the LAN35215 version.

CN2/3: PCI-Express Connector

The PCIe connector is the connection to the system CPU. The position and pin assignments are compliant with the *PCI/104-Express Specification*. (See PC/104 Specifications on page 18)

The LAN25222HR is a "Universal" board, and can connect to either a Type 1 or Type 2 PCIe/104 connector.

4.4 Steps for Installing

1. Always work at an ESD protected workstation, and wear a grounded wrist-strap.
2. Turn off power to the IDAN system.
3. Remove the module from its anti-static bag.
4. Check that pins of the bus connector are properly positioned.
5. Check the stacking order; make sure all of the busses used by the peripheral cards are connected to the cpuModule.
6. Hold the module by its edges and orient it so the bus connector pins line up with the matching connector on the stack.
7. Gently and evenly press the module onto the IDAN system.
8. If any boards are to be stacked above this module, install them.
9. Finish assembling the IDAN stack by installing screws of an appropriate length.
10. Attach any necessary cables to the IDAN system.
11. Re-connect the power cord and apply power to the stack.
12. Boot the system and verify that all of the hardware is working properly.

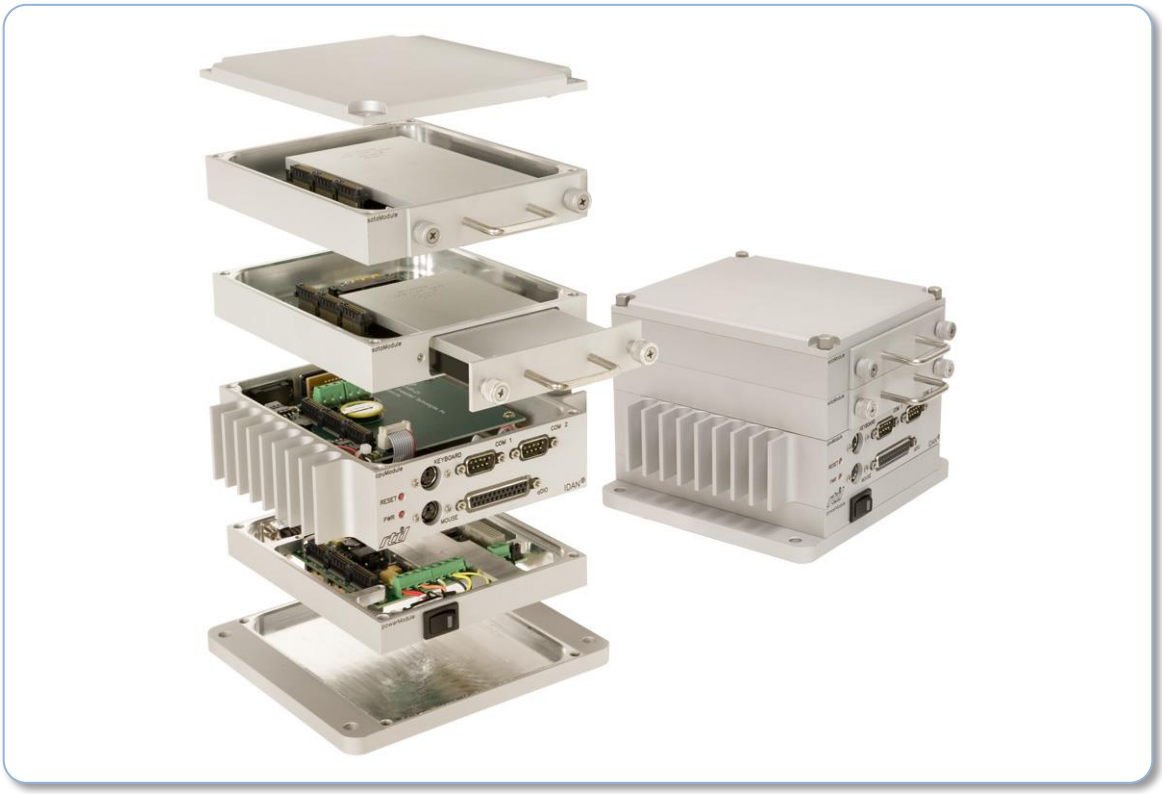

Figure 5: Example IDAN System

5 Functional Description

5.1 Block Diagram

The Figure below shows the functional block diagram of the LAN25215/35215. The various parts of the block diagram are discussed in the following sections.

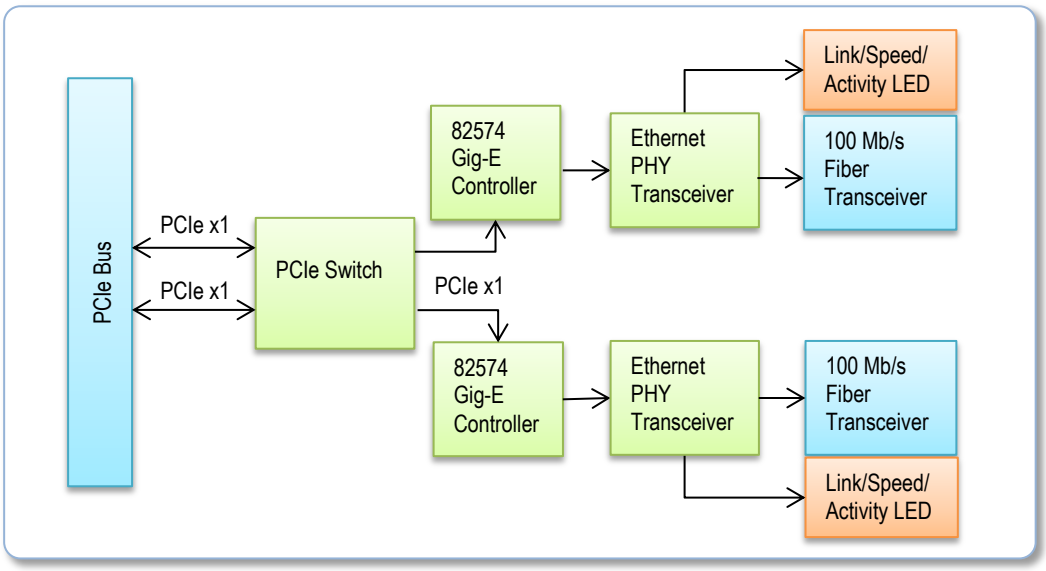

Figure 6: LAN25215/35215 Block Diagram

5.2 PCIe Switch

The LAN25215/35215 provides a PCI Express packet switch to repopulate the lane that it uses. The uplink for the switch is attached to the host through the PCIe/104 bus. A downlink is attached to each of the Ethernet controllers. Then another downlink is fed back to the PCIe/104 bus, and provides connectivity to additional in card in the stack from the LAN25215/35215. This allows the PCIe/104 system to grow beyond the maximum number of PCIe x1 links that can be provided by the host. If all of the peripherals in the system provide repopulation, a very large number of peripherals can be used.

5.3 Fiber Ethernet Connection

5.3.1 Intel WG82574IT Gigabit Ethernet Controller

The LAN25215/35215 features two Intel's WG82574IT Gigabit Ethernet controller used to interface with fiber Ethernet connections. The WG82574IT is an industrial temperature rated Gigabit Ethernet controller which features 9KB Jumbo Frame Support, 40KB packet buffer size and IPv4/6 support.

5.3.2 Cortina (Intel) LXT973 Ethernet PHY Transceiver

The LAN25215/35215 uses two 100Mb/s Ethernet PHY Transceiver to convert twisted-pair from the Ethernet controller to fiber connection.

5.3.3 Fiber Ethernet Transceiver

The fiber connectors on the LAN25215/35215 are fiber transceivers. The transmitter transmits using a 1300 nm surface emitting InGaAsP LED and the receiver receives using an InGaAs PIN photodiode.

Before installing a fiber into the connector, remove the protection plug from the connector.

5.4 Driver Support

For Windows, the Ethernet controller is supported by a driver provided by Intel. A copy of this driver is provided on the companion CD that is shipped with the board, and may also be downloaded from the RTD web site (www.rtd.com) or the Intel web site (www.intel.com). It is recommended that you frequently check the RTD web site for updated documentation and drivers.

Under Linux, the Ethernet controller is supported via the ***e1000e*** kernel module that is included with recent Linux 2.6.x kernels. Most modern desktop Linux distributions will automatically detect the Ethernet controller and load the necessary drivers. Contact the vendor of your Linux distribution for more information.

For other operating systems, the Ethernet controller may be natively supported via built-in drivers. Your operating system vendor should be able to provide the necessary information.

NOTE: Although the Intel WG82574IT is a Gigabit-capable Ethernet controller, the fiber interface is limited to 100Mbit

6 Troubleshooting

If you are having problems with your system, please try the following initial steps:

- **Simplify the System** – Remove modules one at a time from your system to see if there is a specific module that is causing a problem. Perform you troubleshooting with the least number of modules in the system possible.

- **Swap Components** – Try replacing parts in the system one at a time with similar parts to determine if a part is faulty or if a type of part is configured incorrectly.

If problems persist, or you have questions about configuring this product, contact RTD Embedded Technologies via the following methods:

Phone: +1-814-234-8087
E-Mail: techsupport@rtd.com

Be sure to check the RTD web site (http://www.rtd.com) frequently for product updates, including newer versions of the board manual and application software.

7 Additional Information

7.1 PC/104 Specifications

A copy of the latest PC/104 specifications can be found on the webpage for the PC/104 Embedded Consortium:

www.pc104.org

7.2 PCI and PCI Express Specification

A copy of the latest PCI and PCI Express specifications can be found on the webpage for the PCI Special Interest Group:

www.pcisig.com

8 Limited Warranty

RTD Embedded Technologies, Inc. warrants the hardware and software products it manufactures and produces to be free from defects in materials and workmanship for one year following the date of shipment from RTD Embedded Technologies, Inc. This warranty is limited to the original purchaser of product and is not transferable.

During the one year warranty period, RTD Embedded Technologies will repair or replace, at its option, any defective products or parts at no additional charge, provided that the product is returned, shipping prepaid, to RTD Embedded Technologies. All replaced parts and products become the property of RTD Embedded Technologies. Before returning any product for repair, customers are required to contact the factory for a Return Material Authorization (RMA) number.

This limited warranty does not extend to any products which have been damaged as a result of accident, misuse, abuse (such as: use of incorrect input voltages, improper or insufficient ventilation, failure to follow the operating instructions that are provided by RTD Embedded Technologies, “acts of God” or other contingencies beyond the control of RTD Embedded Technologies), or as a result of service or modification by anyone other than RTD Embedded Technologies. Except as expressly set forth above, no other warranties are expressed or implied, including, but not limited to, any implied warranties of merchantability and fitness for a particular purpose, and RTD Embedded Technologies expressly disclaims all warranties not stated herein. All implied warranties, including implied warranties for merchantability and fitness for a particular purpose, are limited to the duration of this warranty. In the event the product is not free from defects as warranted above, the purchaser's sole remedy shall be repair or replacement as provided above. Under no circumstances will RTD Embedded Technologies be liable to the purchaser or any user for any damages, including any incidental or consequential damages, expenses, lost profits, lost savings, or other damages arising out of the use or inability to use the product.

Some states do not allow the exclusion or limitation of incidental or consequential damages for consumer products, and some states do not allow limitations on how long an implied warranty lasts, so the above limitations or exclusions may not apply to you.

This warranty gives you specific legal rights, and you may also have other rights which vary from state to state.

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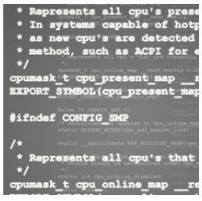

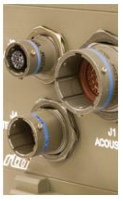
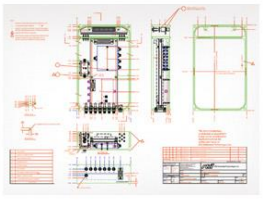

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